to measuring the flow of a river by putting the float in an TABLE 2.—Average vertical temperature gradients between 3,000 and 8,000 eddy near the shore, while the 8,000-meter level is safely below the upper inversion. It is in this region of comparatively uniform changes that seasonal effects are most clearly seen.

Table 1.—Observed vertical temperature gradients between 3,000 and 8,000 meters elevation.

LINDENBERG.

Date.	Eleva- tion.	Temper- ature.	<u>4 /</u> 100 m.	Date.	Eleva- tion.	Temper- ature.	100 m.
	Meters.	○C. - 7.02			Melers.	°C.	
Aug. 3,1905	3,514 7,652	7.0₹ 40.0\$	0.798	July 5, 1906	\$ 3,000 \$ 8,000	1.37 -34.95	0.72
Aug. 29, 1905	3,000	- 2.42 -44.5	0.842	Aug. 2, 1906	3,070 7,810	2.07	0. 81
	8,000 8,000				7,810 2,870	-36. 7\$ 3. 2}	
Aug. 31, 1905	\$ 8,000 \$ 8,000	-1.07 -27.25	0. 524	Sept. 6, 1906	2,870 8,390	-28, 45	0, 57
Jan. 4, 1906	3,000 8,000	- 4.84 -41.75	0. 738	Feb. 7,1907	3,000 8,000	-14.27 -58.29	0. 88
Feb. 1,1906	3,000	- 9.6/ -42.45	0.656	July 4, 1907		1. 47 -26. 65	0.56
July 4,1906	3,022 7,782	0. 3 -35. 3	0. 746		1 2,000		
	<u>.</u>	!	PAVL	OVSK.		' '	
Feb. 9,1905	5 2,280	17.87 50.05	0.642	Feb. 1,1906	5 3,000	-22.17 -32.75	(0, 358
	\$ 8,000 \$ 3,000	50, 05 0, 92) 5,960 (3,000	-32, 75 2, 37	•
July 6, 1905	8,000 3,000	0.97 -30.95	0. 636	July. 5,1906	5,820	2.87 -11.75	(0, 497
Aug. 29,1905	8,000	- 4. 4/ -35. 75	0.626	Sept. 6,1906	3,060 8,000	- 3. 6/ -36, 3/	0, 662
Aug. 30, 1905	\$ 3,000	- 4.07 -32.89	0. 576	Jan. 14,1907	3,000 7,800	-21.07 -47.8	0, 670
	8,000 2,970 8,000	- 8.3 -41.6	0.662	Feb. 7, 1907	§ 3,000	-12.67 -49.55	0, 788
•	\$ 8,000 \$ 3,000	—41.65 —16.7₹		i i	\$ 8,000 \$ 3,000	-49, 5ζ' -15, 5ζ	
Mar. 1,1906	\$ 3,000 \$ 8,000	-52.55	0, 716	Mar. 7,1907	8, 020	-11.35	0.575
			STRAS	SBURG.			
Гап. 5, 1905	Meters. 5 3,000	° C. - 4.2⟨ -41.4⟨	0. 744	Mar. 1, 1906	Meters. 3,000	° C -12.4/ -35.69	0. 65
· i	8,000 3,000	41.45 14.0≀		٠ .	7,000 3,000	-35, 65 2, 27	
Mar. 2, 1905	8,000 3,000	—51.3 <u>\</u>	0. 746	July 4, 1906	₹ 7,000	-24,5€	0, 66
uly 6, 1905	\$ 3,000 \$ 8,000	0. 17 -31. 75	0, 686	July 5, 1906	\ 3,000 } 8,000	2. 67 —29. 68	0, 64
Aug. 3, 1905	8,000 8,000	8, 27	0.546	July 6, 1906	3,000	1.97	0. 57
	8,000 3,000	-19, 15 - 4, 74		-) 3.000 (8,000 ;	30. 7 (8. 0)	
Aug. 29, 1905) 8.000 l	—37. 75	0.660	Aug. 2, 1906	8,000	—25.3 (0. 66
Aug. 30, 1905	\$ 3,000 8,000	- 4.37 -36.45	0.642	Sept. 6, 1906	8,000 8,000	3. 77 —27. 96	0, 60
ug. 31, 1905	3,000	- 2.86 -33,76	0.618	Jan. 4, 1907	\$ 3,000	- 5, 17	0, 66
-	\$ 8,000 \$ 3,000	- 8. 5 <i>t</i>	0, 696		8,000 8,000	-38.4₹ -11.4₹	
an. 4, 1906	8,000 3,000	-43.3() 8.4()			8,000	-51, 4\(\) -15, 4\(\)	0, 80
Feb. 1, 1906	3 8,000	-41. 25	0. 656	Mar. 7, 1907 .	s,000	-17. 25	0. 67
,			TRAI	PPES.			
	1						
an. 5, 1905	3,000 8,000	- 7. 84 -45. 65	0, 756	Mar. 1, 1906.	8,000 7,000	— 8, 3₹ —42, 4\$	0, 853
	7 8,000 6 3,000	-45.65 -17.07	0, 756 0, 850	Mar. 1, 1906 July 4, 1906	7,000 3,000	$-42.45 \\ -0.27$	
far. 2, 1905	8,000 3,000 7,000 3,000	-45. 66 -17. 07 -51. 06 0. 67	0,850	July 4, 1906.	7,000 3,000 8,000 3,000	$ \begin{array}{c c} -42.45 \\ -0.25 \\ -31.75 \\ 3.27 \end{array} $	n. 60
far. 2, 1905 uly 6, 1905	3,000 3,000 7,000 3,000 8,000 3,000	-45.68 -17.02 -51.08 0.62 -27.68	0, 850 0, 564	July 4, 1906 July 5, 1906	7,000 3,000 8,000 3,000 8,000 3,000	$ \begin{bmatrix} -42.45 \\ -0.26 \\ -31.75 \\ \hline 3.26 \\ -27.85 $	0. 60 0, 60
far. 2, 1905 uly 6, 1905 ug. 3, 1905	3,000 3,000 7,000 3,000 3,000 3,000 5,000 7,800	-45.6(-17.0) -51.0(0.6) -27.6(8.7) -23.7(0,850 0,564 0,573	July 4. 1906 July 5, 1906 Aug. 2, 1906	7,000 3,000 8,000 3,000 8,000 3,000 8,000	-42.45 - 0.24 -31.75 3.24 -27.85 11.74 -19.95	0. 60 0, 60
far. 2, 1905 uly 6, 1905 ug. 3, 1905	\$ 8,000 \$ 3,000 \$ 7,000 \$ 3,000 \$ 8,000 \$ 3,000 \$ 7,800 \$ 5,000 \$ 8,000	-45.6(-17.0() -51.0() 0.6() -27.6() 8.7() -23.7() -5.6() -42.4()	0, 850 0, 564	July 4, 1906 July 5, 1906	7,000 3,000 3,000 3,000 8,000 8,000 8,000 8,000 8,000	-42, 44 - 0, 24 -31, 74 3, 27 -27, 84 11, 74 -19, 95 -0, 47 -28, 56	0. 60 0. 60 0. 60
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 29, 1905	\$ 8,000 \$ 3,000 \$ 7,000 \$ 8,000 \$ 8,000 \$ 7,800 \$ 7,800 \$ 8,000 \$ 8,000 \$ 8,000	-45.6(-17.0) -51.0(-27.6) -27.6(-3.7) -23.7(-5.6) -42.4(-1.1)	0,850 0,564 0,573	July 4. 1906 July 5, 1906 Aug. 2, 1906	7,000 3,000 3,000 8,000 8,000 8,000 8,000 8,000 8,000 3,000 3,000	-42, 44 - 0, 24 -31, 74 3, 27 -27, 84 11, 74 -19, 95 -0, 47 -28, 56 -3, 27	0, 60 0 0, 6 00 0, 6 00 0, 570
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 29, 1905 ulg. 30, 1905	9 8,000 9 3,000 7 0,000 9 3,000 9 8,000 9 7,800 9 7,800 9 8,000 9 8,000 8 8,000	-45.66 -17.00 -51.00 -0.66 -27.66 8.77 -23.76 -42.46 -1.17 -41.66	0,850 0,564 0,573 0,736 0,810	July 4, 1906 July 5, 1906 Aug. 2, 1906 Sept. 6, 1906 Jan. 4, 1907	7,000 3,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000	-42, 45 - 0, 27 - 3, 27 - 27, 85 11, 72 - 19, 95 - 0, 47 - 28, 56 - 3, 27 - 41, 85 - 14, 67	0, 60 0, 60 0, 60 0, 57 0, 77
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 29, 1905 ulg. 30, 1905 ulg. 31, 1905	3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000 3,000	-45. 6 (-17. 0 (-51. 0 (-27. 6 (-27. 6 (-23. 7 (-5. 6 (-42. 4 (-1. 1) (-41. 6 (-4. 4 (-7. 7 & (0, 850 0, 564 0, 573 0, 736 0, 810 0, 796	July 4, 1906 July 5, 1906 Aug. 2, 1906 Sept. 6, 1906 Jan. 4, 1907 Feb. 7, 1007	7,000 3,000 3,000 3,000 8,000 3,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000	-42, 44 - 0, 24 -31, 74 -27, 84 11, 74 -19, 94 -28, 54 -3, 24 -41, 85 -57, 96	0, 60 0, 60 0, 60 0, 57 0, 77 0, 86
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 29, 1905 ulg. 30, 1905 ulg. 31, 1905	\$,000 \$ 3,000 \$ 7,000 \$ 3,000 \$ 8,000 \$ 7,800 \$ 7,800 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 3,000 \$ 3,000 \$ 7,540 \$ 7,540 \$ 7,540 \$ 7,540	-45. 65 -17. 00 -51. 00 -61/-27. 69 -27. 69 -23. 76 -32. 46 -1. 19 -41. 66 -37. 88 -5. 77 -41. 44	0,850 0,564 0,573 0,736 0,810	July 4, 1906 July 5, 1906 Aug. 2, 1906 Sept. 6, 1906 Jan. 4, 1907	7,000 3,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000	-42, 45 - 0, 27 - 3, 27 - 27, 85 11, 72 - 19, 95 - 0, 47 - 28, 56 - 3, 27 - 41, 85 - 14, 67	0, 600 0, 600 0, 600 0, 570 0, 770 0, 860
fan. 5, 1905 far. 2, 1905 fuly 6, 1905 fung. 3, 1905 fung. 29, 1905 fung. 30, 1905 fung. 31, 1906 fung. 31, 1906 fung. 31, 1906	\$,000 \$ 7,000 \$ 7,000 \$ 3,000 \$ 8,000 \$ 8,000 \$ 7,800 \$ 3,000 \$ 8,000 \$ 8,000 \$ 8,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000	-45. 6 (-17. 0 (-51. 0 (0. 6 () -27. 6 () -23. 7 (-5. 6 () -42. 4 () -41. 6 (-4. 4 () -37. 8 ()	0, 850 0, 564 0, 573 0, 736 0, 810 0, 796	July 4, 1906 July 5, 1906 Aug. 2, 1906 Sept. 6, 1906 Jan. 4, 1907 Feb. 7, 1007	7,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000	-42, 44 - 0, 24 -31, 74 -27, 84 11, 74 -19, 94 -28, 54 -41, 85 -41, 67 -5, 54	0, 600 0, 600 0, 600 0, 579 0, 770 0, 866
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 29, 1905 ulg. 30, 1905 ulg. 31, 1905 an. 4, 1906	8,000 7,000 7,000 8,000 8,000 7,800 7,800 8,000 8,000 7,540 9,3,000 7,540 9,3,000 7,540 9,3,000	-45. 65 -17. 01 -51. 05 -27. 65 -27. 65 -28. 76 -28. 76 -41. 46 -41. 66 -5. 77 -41. 44 -41. 44 -41. 44	0,850 0,564 0,573 0,736 0,810 0,796 0,786	July 4, 1906. July 5, 1906. Aug. 2, 1906. Sept. 6, 1906. Jan. 4, 1907. Feb. 7, 1007. July 4, 1907	7,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000	-42, 44 - 0, 24 -31, 74 -27, 84 11, 74 -19, 94 -28, 54 -41, 85 -41, 67 -5, 54	0, 600 0, 600 0, 600 0, 579 0, 770 0, 866
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 29, 1905 ulg. 30, 1905 ulg. 31, 1905 an. 4, 1906) 8,000) 7,000) 7,000) 8,000) 8,000) 7,800) 7,800) 8,000) 8,000) 8,000) 8,000) 7,540) 8,000) 7,540) 7,540) 7,540) 7,850) 8,000) 7,850) 8,000) 7,850) 8,000) 7,850) 8,000) 7,850) 8,000) 7,850) 8,000) 7,850) 3,000) 3,000 3	-45. 64 -17. 04 -51. 05 -6. 64 -27. 65 -3. 77 -23. 77 -24. 46 -41. 65 -41. 66 -4. 42 -37. 85 -41. 46 -41. 46 -41. 46 -41. 46 -41. 46 -41. 46 -41. 46	0, 850 0, 564 0, 573 0, 736 0, 810 0, 736 0, 786 0, 786	July 4, 1906. July 5, 1906. Aug. 2, 1906. Sept. 6, 1906. Jan. 4, 1907. Feb. 7, 1007. July 4, 1907	7,000 3,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000	-42, 44 -0, 24 -31, 74 3, 27 -27, 85 -11, 72 -19, 95 -0, 44 -28, 54 -3, 27 -41, 85 -5, 56 -5, 56 -34, 05	0, 600 0, 600 0, 500 0, 570 0, 860 0, 570
far. 2, 1905 ruly 6, 1905 rug. 3, 1905 rug. 30, 1905 rug. 30, 1905 rug. 31, 1905 rug. 31, 1906 reb. 1, 1906	\$ 8,000 \$ 3,000 \$ 7,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 8,000 \$ 8,000 \$ 3,000 \$ 3	-45.66 -17.02 -51.05 -6.62 -27.65 -8.77 -28.76 -28.76 -41.66 -41.66 -41.42 -37.85 -33.86	0, 850 0, 564 0, 573 0, 736 0, 810 0, 796 0, 594 UCCC	July 4, 1906. July 5, 1906. Aug. 2, 1906. Sept. 6, 1906. Jan. 4, 1907. Feb. 7, 1007. July 4, 1907 LE. Sept. 5, 1907.	7,000 3,	-42, 44 - 0, 24 - 31, 75 3, 24 -27, 83 11, 74 -19, 95 -41, 85 -41, 85 -41, 85 -41, 65 -5, 54 -31, 95 -31, 9	0, 60 0, 60 0, 57 0, 77 0, 86 0, 57 0, 57
far. 2, 1905 ruly 6, 1905 rug. 3, 1905 rug. 29, 1905 rug. 30, 1905 rug. 31, 1906 ruly 5, 1906 ruly 5, 1906 ruly 5, 1906	\$ 8,000 \$ 7,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 7,540 \$ 3,000 \$ 7,550 \$ 8,000 \$ 7,850 \$ 8,000 \$ 8,000 \$ 7,850 \$ 8,000 \$ 8,000 \$ 7,850 \$ 8,000 \$ 8	-45. 64 -17. 02 -51. 05 0. 62 8. 77 -23. 77 -5. 64 -12. 47 -41. 67 -41. 42 -37. 85 -5. 77 -41. 4(1) -33. 85 -43. 55 -43. 55 -43. 55 -44. 62 -45. 64 -47. 65 -47. 65	0,850 0,564 0,573 0,736 0,810 0,736 0,786 0,594 LTCC	July 4, 1906 July 5, 1906 Aug. 2, 1906 Sept. 6, 1906 Jan. 4, 1907 Feb. 7, 1007 July 4, 1907 LE. Sept. 5, 1907 Jan. 3, 1908	7,000 3,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 9,050 9,050 9,050 8,375 8,	-42, 44 -0, 24 -31, 75 3, 27 -11, 77 -19, 95 0, 44 -28, 56 -41, 85 -57, 96 -57, 96 -57, 96 -31, 96 -9, 77 -9, 77 -51, 15	0, 60 0, 60 0, 60 0, 57 0, 86 0, 57 . 586 . 720
far. 2, 1905 uly 6, 1905 ug. 3, 1905 ug. 29, 1905 ug. 30, 1905 an. 4, 1906 eb. 1, 1906 uly 5, 1906 uly 5, 1906) 8,000) 7,000) 7,000) 3,000) 3,000) 3,000) 3,000) 3,000) 8,000) 7,850 (3,000) 7,850 (3,000) 7,850 (3,490) 8,400) 8,400) 8,400) 8,400) 8,400) 8,400) 8,500) 8,500 8	-45. 6(-17. 0)(-51. 0)(-51. 0)(-51. 0)(-6. 1. 1)(-27. 6)(-27. 6)(-27. 6)(-27. 6)(-4	0, 850 0, 564 0, 573 0, 736 0, 810 0, 796 0, 594 UCCC	July 4, 1906. July 5, 1906. Aug. 2, 1906. Sept. 6, 1906. Jan. 4, 1907. Feb. 7, 1007. July 4, 1907 LE. Sept. 5, 1907.	7,000 3,000 8,	-42, 44 - 0, 24 - 31, 75 - 3, 27 - 11, 77 - 19, 95 - 0, 44 - 28, 54 - 14, 67 - 57, 97 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 34, 07 - 37, 97 - 38, 97	0, 60 0, 60 0, 60 0, 57 0, 86 0, 57 . 586 . 720
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 29, 1905 ulg. 30, 1905 alg. 31, 1905 alg. 31, 1906 elb. 1, 1906 ulg. 5, 1906 ulg. 2, 1906 alg. 2, 1906 alg. 14, 1907	2 8,000 3,000 7,000 3,000	-45. 6(-17. 0)(-51. 0)(-51. 0)(-51. 0)(-6. 1. 1)(-27. 6)(-27. 6)(-27. 6)(-27. 6)(-4	0,850 0,564 0,573 0,736 0,810 0,736 0,786 0,594 LTCC	July 4, 1906 July 5, 1906 Aug. 2, 1906 Sept. 6, 1906 Jan. 4, 1907 Feb. 7, 1007 July 4, 1907 LE. Sept. 5, 1907 Jan. 3, 1908	7,000 3,000 8,	-42, 44 -0.2, 175 3.24 -11.77 -19.95 -0.44 -28.57 -11.89 -14.69 -57.96 -57.96 -57.96 -57.97 -31.97 -4.00 -31.97 -4.00 -31.97 -4.00 -31.97	0, 60 0, 60 0, 60 0, 57 0, 57 0, 86 0, 57 588 72 668
far. 2, 1905 uly 6, 1905 ulg. 3, 1905 ulg. 30, 1905 ulg. 30, 1905 ulg. 31, 1905 elb. 1, 1906 ulg. 5, 1906 ulg. 2, 1906 ulg. 2, 1906 ulg. 2, 1907 elb. 7, 1907	\$ 8,000 \$ 7,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 7,540 \$ 3,000 \$ 7,540 \$ 3,000 \$ 7,850 \$ 8,000 \$ 3,000 \$ 7,540 \$ 3,000 \$ 3,000 \$ 7,540 \$ 3,000 \$ 3	-45. 6(-17. 0)(-51. 0)(-51. 0)(-51. 0)(-6. 1. 1)(-27. 6)(-27. 6)(-27. 6)(-27. 6)(-4	0,850 0,564 0,573 0,736 0,810 0,766 0,766 0,594 UCCC .795 .683 .647	July 4, 1906. July 5, 1906. Aug. 2, 1906. Sept. 6, 1906. Jan. 4, 1907. Feb. 7, 1007. July 4, 1907 LE. Sept. 5, 1907. Jun. 3, 1908. Mar. 5, 1908.	7,000 3,000 8,	-42, 44 -0.31, 75 3, 24 -11, 74 -19, 95 -0.44 -28, 54 -11, 85 -14, 65 -57, 95 -57, 95 -31,	0.600 0.600 0.600 0.573 0.773 0.866 0.576
far. 2, 1905 fuly 6, 1905 fuly 6, 1905 fulg. 3, 1905 fulg. 30, 1905 fulg. 31, 1905 fulg. 31, 1906 fulg. 31, 1906 fulg. 31, 1906 fulg. 2, 1906 fulg. 2, 1906 fulg. 2, 1906 fulg. 2, 1907 fulg. 7, 1907 fulg. 7, 1907 fulg. 7, 1907	8,000 7,000 7,000 8,000 8,000 8,000 8,000 8,000 7,540 8,000 7,540 8,46	-45. 64 -17. 04 -51. 05 -0. 64 -27. 64 -23. 76 -42. 44 -1. 17 -41. 64 -4. 12 -37. 84 -4. 12 -33. 85 -4. 12 -4. 55 -4. 45 -4. 55 -4. 55 -55 -55 -55 -55 -55 -55 -55 -55 -55	0,850 0,564 0,573 0,736 0,810 0,736 0,594 UCC .795 .683 .647 .732	July 4, 1906. July 5, 1906. Aug. 2, 1906. Sept. 6, 1906. Jan. 4, 1907. Feb. 7, 1007. July 4, 1907 LE. Sept. 5, 1907. Jun. 3, 1908. Feb. 6, 1908. July 20, 1908.	7,000 3,000 8,	-42, 44 -0.2, 45 -0.1, 75 -0.1, 75 -11, 72 -12, 85 -14, 87 -14, 87 -14, 87 -15, 57 -34, 04 -31, 95 -9, 72 -51, 15 -35, 96 -9, 72 -51, 15 -35, 96 -9, 72 -51, 15 -30, 97 -55, 75 -30, 97 -55, 75 -30, 97 -55, 75 -30, 97 -55, 75 -30, 97 -55, 75 -55, 7	0.600 0.600 0.600 0.573 0.773 0.866 0.574 .586 .724 .698 .917
far. 2, 1905 fuly 6, 1905 fulg. 3, 1905 fulg. 29, 1905 fulg. 30, 1905 fulg. 31, 1905 fulg. 31, 1906 fulg. 31, 1906	\$ 8,000 \$ 7,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 3,000 \$ 7,540 \$ 3,000 \$ 7,540 \$ 3,000 \$ 7,850 \$ 8,000 \$ 3,000 \$ 7,540 \$ 3,000 \$ 3,000 \$ 7,540 \$ 3,000 \$ 3	-45. 6(-17. 0)(-51. 0)(-51. 0)(-51. 0)(-6. 1. 1)(-27. 6)(-27. 6)(-27. 6)(-27. 6)(-4	0,850 0,564 0,573 0,736 0,810 0,766 0,766 0,594 UCCC .795 .683 .647	July 4, 1906. July 5, 1906. Aug. 2, 1906. Sept. 6, 1906. Jan. 4, 1907. Feb. 7, 1007. July 4, 1907 LE. Sept. 5, 1907. Jun. 3, 1908. Mar. 5, 1908.	7,000 3,000 8,	-42, 44 -0.31, 75 3, 24 -11, 74 -19, 95 -0.44 -28, 54 -11, 85 -14, 65 -57, 95 -57, 95 -31,	0, 85 0, 600 0, 600 0, 57 0, 77 0, 86 0, 57 0, 600 0, 600

meters elevation, $\frac{100 \text{ m}}{100 \text{ m}}$

Place.	Summer.	Winter.			
Lindenberg. Pavlovsk. Strassburg. Trappes. Uccle	0, 699 0, 599 (0, 625) 0, 626 0, 637 0, 655	0.758 0.623 (0.667) 0.705 0.775 0.745			
Average	0.643 (0.648)	0.721 (0.780)			

The observations obtained at Uccle are copied from Ciel et Terre, the others from Veröffentlichungen der International Commission für Wissenschaftliche Luftschiffahrt.

The average gradients, exprest in change of temperature in degrees centigrade per hundred meters change in elevation, are given in Table 2. The seventy-two observations upon which they are based are not nearly enough to secure averages free from storm and other irregularities, but probably are sufficient to demonstrate the kind of change in the gradient caused by change of season. As shown by Table 2 the gradient at each of these stations was greater in winter than during the summer, the general average being about 10 to 9.

Two of the gradients found at Pavlovsk were exceptionally low, probably due to unusual local conditions. The numbers inclosed in parentheses give the averages with these exceptional gradients ruled out. The others with them included.

THE FORMATION OF HAIL.

By Dr. J. B. Gibson. Dated Salisbury, N. C., January 5, 1909.

In the Monthly Weather Review for January, 1906, 34:30, the Editor has published some observations by Doctor Gibson on the formation of hail, and the following extract from a recent letter presents a slight modification of his earlier views:

It is well known that, as a rule, hail precedes the rain. The general It is well known that, as a rule, hail precedes the rain. The general opinion that hailstones have a nucleus of snow I do not believe to be justified. * * * Consider a tumbler of water with all but its central portion turned into crystal ice. This is the natural process in the open air. Before solidification is entirely completed hold the central portion of the glass up at the level of the eye and shake it. A globular mass of unfrozen water and mush ice will be found in the dark central portion. Now let freezing completely solidify the contents of the glass and this central part will be a mass of snow-white strike radiating in every direction. These streaks are as white as cotton thread. This central white core is what is seen in the hailstone, and is produced by the natural core is what is seen in the hallstone, and is produced by the natural process of freezing the central portion last. I venture to assert that snow will not form at all under conditions such that sleet and hail will be generated readily and abundantly.

THE IMPORTANCE OF SYSTEMATIC OBSERVATION OF PERSISTENT METEOR TRAINS.

By C. C. Thowbridge, D. Sc., Columbia University. Dated September, 1908. [Reprinted from The Observatory, No. 402, November, 1908.]

The nature of the luminous cloud occasionally seen in the track of large meteors, known as the presistent streak or train, has long been regarded as a mystery by astronomers. Meteors which leave these long-enduring trains are few in comparison to the total number of meteors that are observed, and consequently even experienced observers are sometimes taken unprepared, and fail to record an observation with desired detail. Many trains have been seen, however, which have remained visible from ten to thirty minutes, and definite and authentic facts concerning them have been recorded in numerous cases. The late Prof. H. A. Newton, of Yale University, and Prof. E. E. Barnard, of the Yerkes Observatory, have both published some valuable observations on the drift of trains in the United States, and the late Prof. A. S. Herschel, Mr. W. F. Denning, Mr. T. W. Backhouse, and others have likewise published many important facts relating to presistent trains seen in England. Indeed, a very large part of the progress of meteoric astronomy